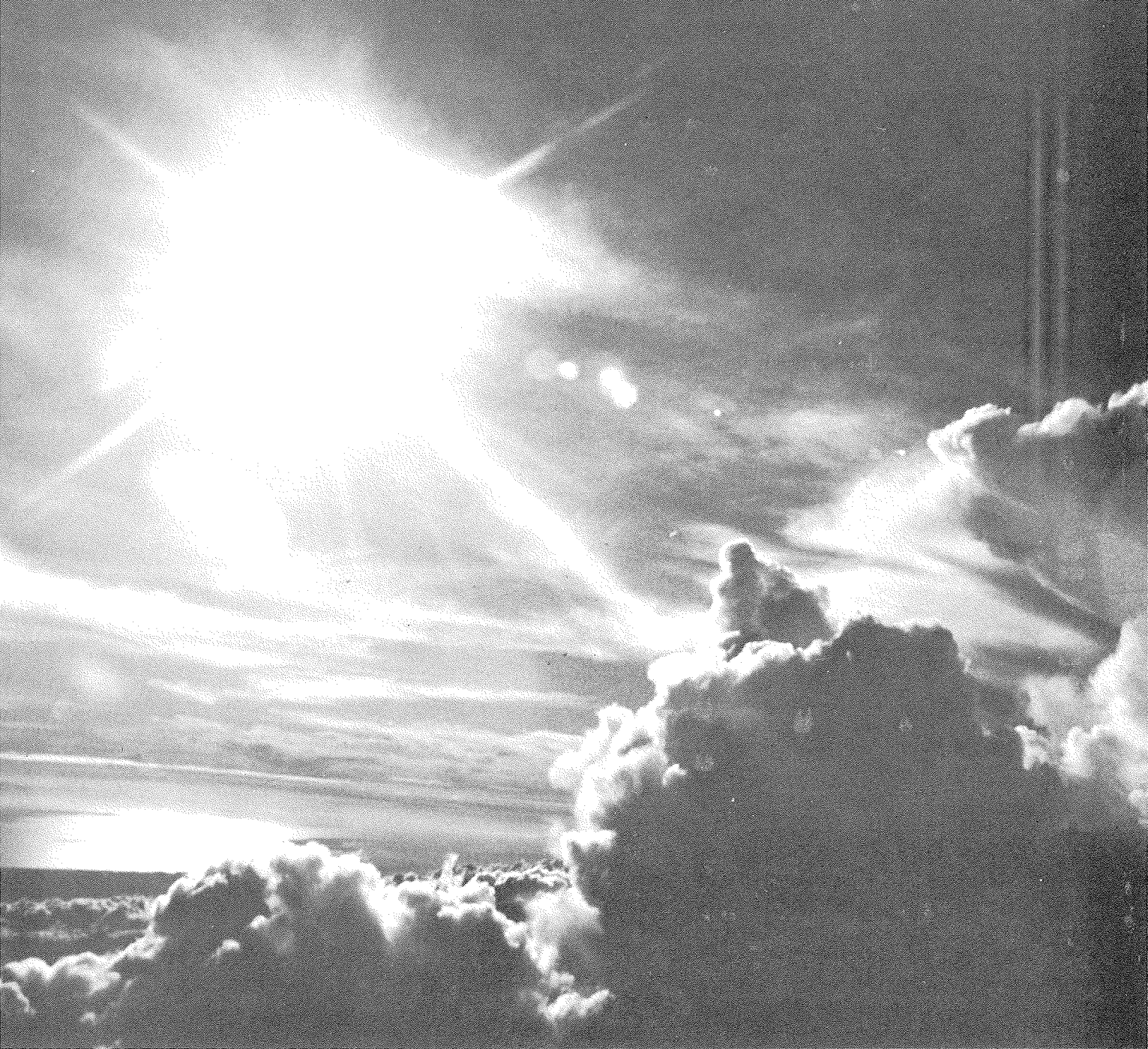


# The NOAA Story



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**





# The NOAA Story

**U.S. DEPARTMENT OF COMMERCE**

Philip M. Klutznick, Secretary

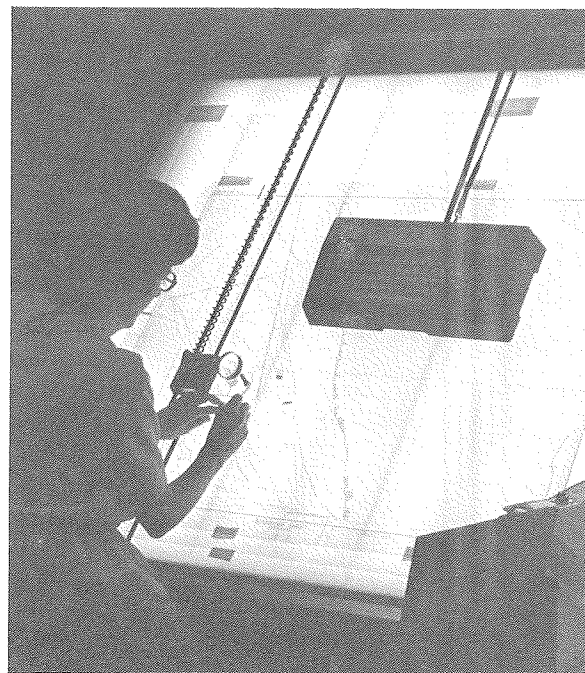
**National Oceanic and Atmospheric Administration**

Richard A. Frank, Administrator



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# A Message from NOAA's Administrator



NOAA's creation in 1970 reflected an understanding of the fundamental stake we as a Nation have in the oceans — as a source of food, as a source of energy, and as a source of recreation — and an appreciation of the profound linkage between global atmospheric and oceanic processes. In the 10 years since, NOAA has evolved rapidly into an organization which establishes national policies for, and manages and conserves, our oceanic, coastal, and atmospheric resources and applies its managerial, research, and technical expertise to provide practical services and essential scientific information.

NOAA's Office of Fisheries manages and conserves the fishery resources within 200 miles of the U.S. coast; protects vital habitats and whales and other marine mammals; oversees programs to assist the economic development of the U.S. fishing industry; and conducts research designed to support these missions.

NOAA's Office of Coastal Zone Management establishes our country's policies for coastal areas and provides funds to States to develop and carry out comprehensive programs to manage the competing demands on their coastal resources, to protect vital natural areas such as wetlands and beaches, and to offset the effects of such energy-related activities as offshore petroleum development. The Office of Coastal Zone Management also protects unique estuarine and coastal areas through its sanctuaries program and seeks to assure broadly that Federal decisions affecting the oceans take into account existing or potential conflicts with other marine users.

NOAA's Office of Oceanic and Atmospheric Services reports and forecasts the weather; provides warnings of hurricanes, tornadoes, and other severe weather phenomena; manages the country's only civilian operational environmental satellites and our Federal oceanographic fleet; prepares nautical and aeronautical charts and other navigational aids; and operates the largest environmental data storage and retrieval system in the world.

To support both its atmospheric and oceanic missions, NOAA's Office of Research and Development conducts research programs, through NOAA laboratories around the country and through cooperative arrangements with universities like the Sea Grant program. In a number of important areas, such as ocean pollution, climate, and weather modification, NOAA is charged with providing leadership and direction for large multi-agency research efforts.

In all of these, NOAA plays an active international role. It negotiates and then participates extensively in a wide range of international living marine resource agreements — including agreements to protect the great whales and North Pacific fur seals, to manage such international fish stocks as salmon and tuna, and to conserve Antarctic living marine resources. It conducts research programs under the auspices of international organizations like the World Meteorological Organization and the Intergovernmental Oceanographic Commission and pursuant to agreements with such countries as France, China, and the Soviet Union. And it is involved in such multi-national efforts as the Global Atmospheric Research Program — the largest atmospheric research program ever — and the negotiations for a Law of the Sea treaty.

None of our responsibilities is more important than transmitting our understanding of the planet's natural processes to the people who are affected by, and who affect, those processes. This publication is an introduction to our organization and to our work.

A handwritten signature in dark ink, reading "Rich A. Frank". The signature is written in a cursive, flowing style with a large, stylized "R" and "A".

Richard A. Frank

# NOAA: History and Organization

Some components of the National Oceanic and Atmospheric Administration (NOAA) are among the oldest in the Federal government. NOAA's National Ocean Survey can trace its origins to the Survey of the Coast organized in 1807, and NOAA's National Marine Fisheries Service was formed in 1871 as the Office of the Commissioner of Fish and Fisheries.

By contrast, some of NOAA's components—such as the National Environmental Satellite Service—are creations of the space age that could not have been possible before the last half of the twentieth century.

Newest of all is the concept of a national oceans and atmosphere agency. Its origin was the 1969 report of the *Commission on Marine Science, Engineering and Resources*—known as the Stratton Commission, after its Chairman Julius A. Stratton—established to develop a plan for an adequate National oceanographic program.

*The Commission concluded that the United States has an important stake in the sea—as a source of economic opportunities and resources, as an area for peaceful collaboration among nations, and as a vital component of the global environment.* In the Commission's view:

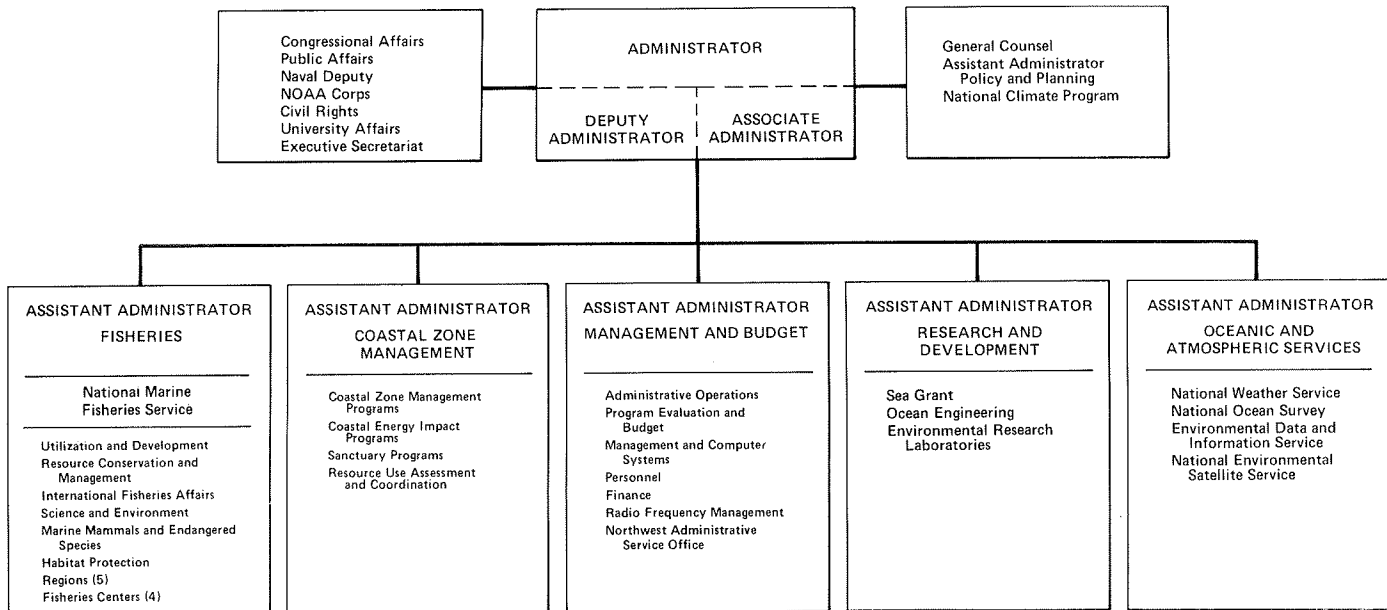
- There was no Federal agency with a mission to use the sea more effectively to meet broad public needs. A new, strong focus for National marine activity was necessary.
- Such an agency could not be organized around the oceans alone. The global environment is affected in fundamental ways by air-sea interactions, and atmospheric sciences share with marine sciences common scales and theoretical bases.

What was needed was an agency organized around the larger context of the air-sea environment. The case was persuasive. NOAA was created in 1970 to improve the Nation's understanding, management and conservation of marine and atmospheric resources.

## A Major Agency

Today NOAA is a major Federal agency. It has more than 15,000 employees—38% of the Department of Commerce workforce—and an annual budget of approximately \$800 million.

**U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**



- NOAA personnel are stationed around the globe—from the Pribiloff Islands in the Bering Sea to the South Pole—and in laboratories, offices, ships, planes, underwater habitats and hundreds of weather stations across the country.
- They operate a vast array of equipment—as complex as NOAA's fleet of 25 ocean-going vessels and 8 aircraft, its earth orbiting environmental satellites, and some of the world's largest computers, and as simple as tide and river gauges and weather balloons.
- NOAA employees constitute a wide array of disciplines—managers, oceanographers, meteorologists, biologists, physicists, economists, cartographers, environmental planners, and many more.
- NOAA publications range from the most specialized of scientific reports to some of the Federal Government's most heavily read documents—such as daily weather forecasts and the best-selling *NOAA Diving Manual*, originally prepared to guide NOAA's 400 certified divers.

### A National Administration

NOAA is a self-contained Administration within the Department of Commerce:

- NOAA's Administrator—the third-ranking official in the Department—reports directly to the Secretary of Commerce.
- NOAA's program activities are organized around four major groupings—fisheries, oceanic and atmospheric services, coastal zone management,

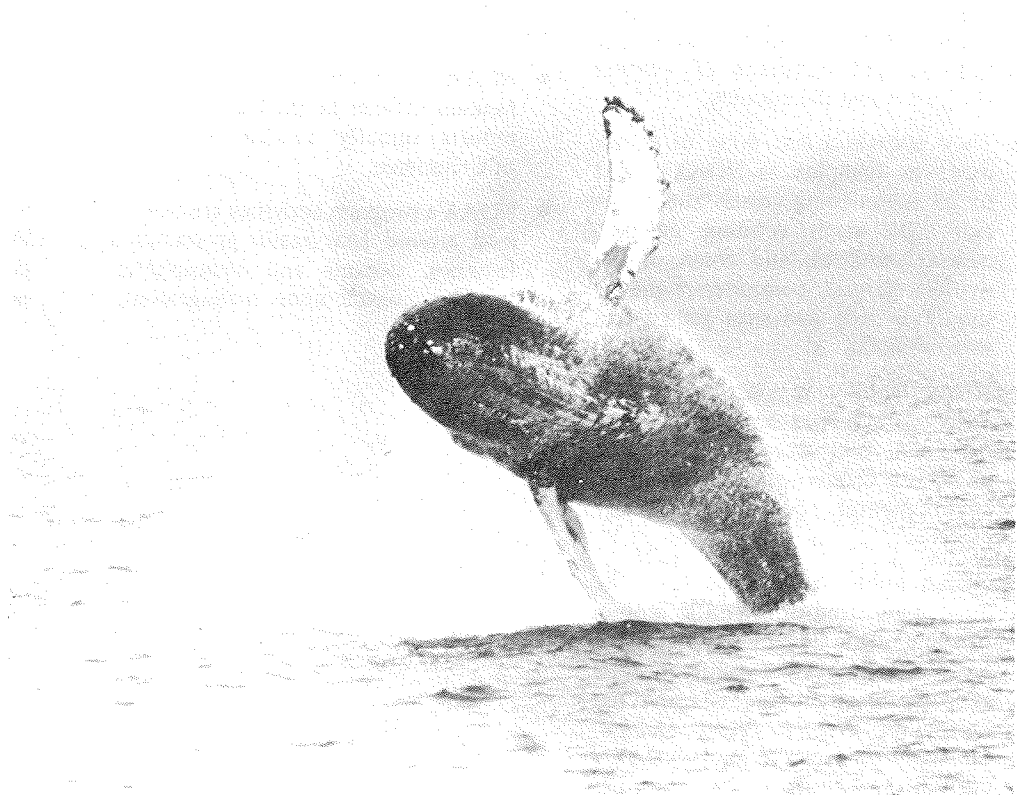
and research and development—each headed by an Assistant Administrator.

- NOAA's program functions are supported by an Office of Management and Budget headed by an Assistant Administrator, and by a full complement of staff offices—from the Office of the General Counsel, handling NOAA legal affairs, to the Office for Civil Rights, ensuring equal opportunity for all NOAA employees.

# FISHERIES: The Living Resources of the Sea

Through its National Marine Fisheries Service, NOAA manages, conserves and protects the living resources of the sea. Between 15 and 20 percent of the world's traditionally harvested fishery resources are found within 200 miles of America's coasts. NOAA administers the Fishery Conservation and Management Act of 1976—a unique law designed to assure that fishing stays within sound biological, economic and other limitations and that United States commercial and recreational fishermen have the opportunity to utilize all of the fishery resources within these limits.

NOAA performs basic biological and technological research through a nationwide network of 24 of the world's finest fishery laboratories. By implementing the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, the Fish and Wildlife Coordination Act, and a variety of other laws, NOAA also seeks to protect vital living marine resource habitats and unique species of marine fish and wildlife—such as the great whales, porpoises, seals and sea turtles.





## Fishery Conservation and Management

In the past, foreign fishermen caught enormous numbers of fish off the United States. The foreign catch within 200 miles of our coasts grew from one million metric tons in 1963 to a peak of 3.5 million metric tons in 1971—83% of the total commercial catch. Foreign and domestic fishing activities seriously damaged the biological foundations of several important stocks of foodfish. And more than 21 million U.S. marine recreational fishermen catch 1.6 billion pounds of finfish annually—about the same as the average amount landed by U.S. commercial fishermen.

**A New National Fishery Regime** By 1977, the foreign catch abruptly dropped to 1.7 million metric tons. One of the reasons for the decline: passage of the *Fishery Conservation and Management Act of 1976 (FCMA)*, the most significant piece of fishery legislation in the history of the United States.

The FCMA authorizes the Federal Government—in cooperation with fishermen and other interested citizens—to manage most commercial and recreational fishing in a fishery conservation zone between three and 200 miles off our coasts, an area about the same size as the lower 48 states. The coastal states continue to be responsible for resource management within the three-mile limit. *We can now conserve and manage our fishery resources for the benefit of present and future generations of the fish, the fishermen and fishing industry, and U.S. consumers.*

**The Regional Fishery Management System** Eight Regional Fishery Management Councils prepare plans that indicate how each fishery should be regulated in view of all relevant scientific, social and economic factors.

- The plans contain objectives for each fishery—appropriate management measures such as gear restrictions and area and season limitations to achieve these objectives.
- The Secretary of Commerce, acting through the Administrator of NOAA, approves and implements the plans and enforces regulations with the help of the United States Coast Guard and state officials.

*The Regional Councils are unique instruments in American Government.* Each Council comprises from 11 to 19 voting members—a cross-section of



governmental, commercial, recreational, environmental, consumer and other interests—who rely heavily on their own local expertise to formulate fishery policies.

**Filling in the Framework** Foreign overfishing has now been eliminated and the domestic fishing industry is booming, but we are still in the early stages of this new management regime, with some matters still to be resolved:

- In some cases, the growth of domestic fishing may be too great for the current stocks of traditional species. Fishing for these species may have to be limited to let the resources rebuild—and alternative fisheries developed.
- The process of choosing fair allocations of limited resources for commercial and recreational fishermen is a major management challenge.
- The new effort to prepare fishery management plans has highlighted the need for better scientific information about fish stocks, their life cycles, and relevant social, economic and ecological factors—and has emphasized the need for better communication of such information to the fishing industry.
- We must improve coordination of Federal fishery management efforts with those of the states—which regulate fishing within the U.S. three mile limit—and with those of other countries.

### Fisheries Utilization and Development

Since the first colonists landed at Jamestown and Plymouth, the American commercial fishing industry has made important contributions to our

economy. *Today, it produces food and industrial goods valued at \$7 billion annually and creates direct employment for more than 250,000 workers.*

**The Wave of the Future** Under the FCMA, our fishing industry should produce dramatically greater contributions. For example, the development of just a few new fisheries—off Alaska, the West Coast, the Gulf of Mexico, New England, and the Mid-Atlantic—could produce 40,000 new jobs by 1990, add \$1.3 billion to the U.S. economy, and reduce our international trade deficit by more than \$1 billion per year.

*NOAA is working with Federal, state and local agencies, private industry and consumers to achieve these benefits through a major Federal initiative announced in 1979.* The focus is on development of plentiful species rarely harvested by U.S. fishermen—such as Alaskan bottomfish and East Coast squid—found off our coasts in large quantities. In coordination with other Federal agencies, NOAA:

- Provides information on domestic and foreign market conditions
- Negotiates lower tariffs, quotas and other barriers to U.S. fishery exports
- Assists fishing industry access to private financing to build and repair fishing vessels and gear
- Reexamines the regulatory burden on fishing enterprises with an eye to reducing it
- Conducts research to provide better information on the safety, quality, identity and nutritional value of seafoods
- Identifies additional needed port and harbor facilities and encourages their construction

- Develops technology and disseminates technical information to help the fishing industry meet changing needs
- Helps in general to pull together the Government-wide array of programs that support and encourage domestic fishermen to pursue non-traditional fish species

## Habitat Protection

*Sustaining and increasing our fish resources require protection of coastal and river environments—where most marine fish spend critical portions of their lives.*

The NOAA Habitat Protection Program helps minimize habitat losses and degradation by providing advisory and consulting services to Federal and state agencies that sponsor or permit development projects. These services include:

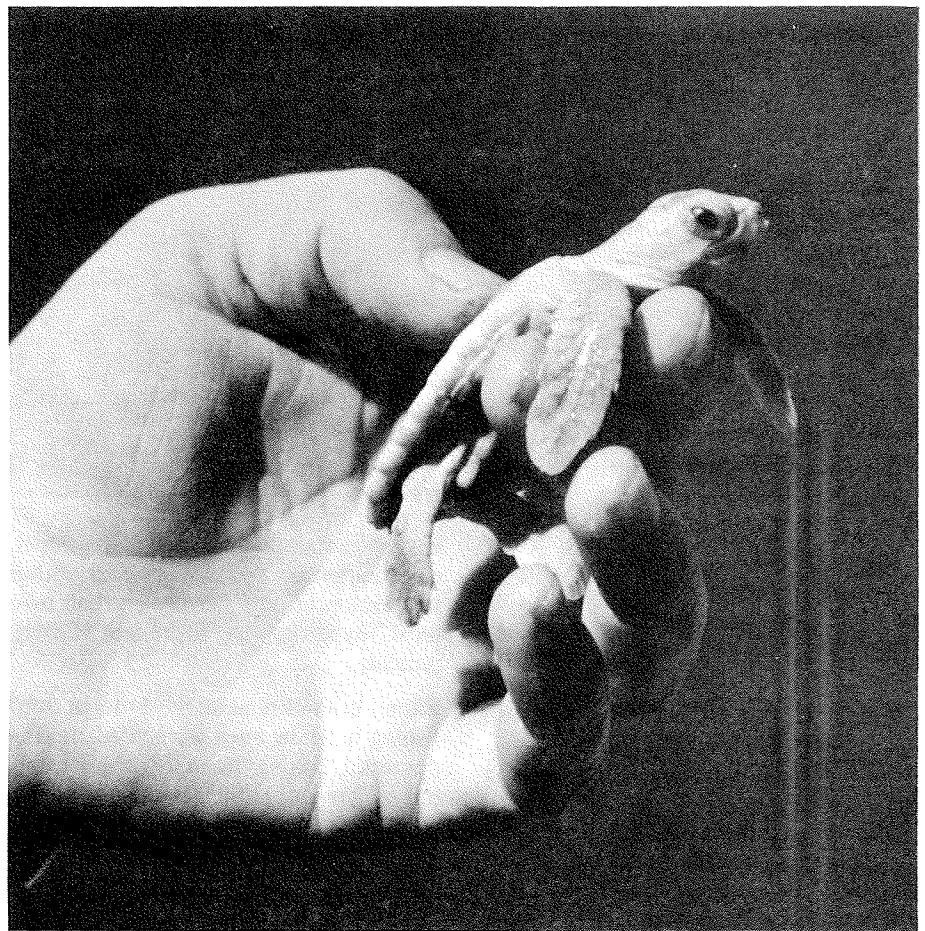
- Analyzing and commenting on the environmental impacts of activities by other agencies: construction projects by the Army Corps of Engineers, permits for dredging and filling to create industrial and residential waterfront property, applications for power plant construction, and spoilage and waste discharge permits
- Research on habitat requirements of marine animals, including marine mammals and endangered species
- Monitoring the quality of the marine environment

## Conservation of Endangered Species and Marine Mammals

*NOAA has the responsibility for conserving marine mammals and endangered marine species—including whales, porpoises, seals and sea turtles—under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.*

**Conserving the Whales** NOAA's Administrator is the United States representative to the International Whaling Commission, which regulates most of the world's whaling. U.S. commercial whaling was prohibited in 1972—and the United States has advocated strong international protection measures for these special mammals.

Although U.S. support for a moratorium on all commercial whaling has been only partially successful, in recent years NOAA has played a key role in obtaining substantial reductions in IWC whaling quotas and a moratorium on whaling by factory ships for all species



but the minke whale. The U.S. has also supported the creation of an Indian Ocean Sanctuary barring all commercial whaling.

**Administering Conservation Laws** NOAA's conservation responsibilities include:

- Surveillance to stop illegal imports and exports of parts and products of endangered and threatened species
- Administration of the Pribilof Islands in the Bering Sea: a special reservation for the conservation and management of a herd of Northern Pacific fur seals under a four-nation agreement supervised by the United States; a herd that has grown from 200,000 in 1911 to almost 1.4 million today
- Membership on the U.S. Endangered Species Committee to determine whether exemptions should be granted from the Endangered Species Act prohibition against activities that may jeopardize threatened or endangered species of their critical habitats
- Regulation of the incidental take of marine mammals in commercial

fisheries, including those by foreign fishermen operating within the U.S. Fishery Conservation Zone

**Conducting Research** NOAA does theoretical and applied research to support its conservation responsibilities. For example:

- NOAA studies sea turtle population dynamics and migratory patterns, life histories, geographical distributions and critical habitats and aims to develop a practical way to reduce the incidental catch of sea turtles by shrimp boats without reducing fishing effectiveness.
- An escape device designed cooperatively by NOAA and private industry now enables fishermen to rescue porpoises caught in tuna nets.
- NOAA assessments of whale catches, age, growth and reproductive history help determine the current status of exploited stocks throughout the world. This research uses diverse techniques—vessel and aerial surveys, counting stations along whale migration routes, and analyses of commercial whaling vessel logbooks to obtain historical data on pre-exploitation population sizes.

## Fisheries and Marine Mammal Research

*Research is an integral part of all NOAA's living marine resource activities—and NOAA's marine fisheries research is the finest in the world.*

- Information on stock abundance, composition, location and condition is necessary to develop fishery management plans and to maintain their effectiveness.
- International agreements rely on NOAA expertise in allocating catches among countries.
- NOAA's information about fish stocks is central to its judgments about the effects of projects such as oil leasing on the Outer Continental Shelf, dredging and filling of habitat, and constructing new facilities on the coasts.

**World Renowned Labs** NOAA's nationwide system of more than 20 of the world's finest fishery laboratories—administered from Woods Hole, Massachusetts; Miami, Florida; La Jolla, California; and Seattle, Washington—performs a wide range of tasks, resource assessment, ecosystems analysis, experimental biology, pathobiology, fishery engineering, technology development,

food research, basic science, conservation engineering, and aquaculture research.

## International Activities

NOAA participates extensively in international living marine resource treaty negotiations, United Nations international development activities, and collection and dissemination of information on foreign production and market activities. Its international activities include:

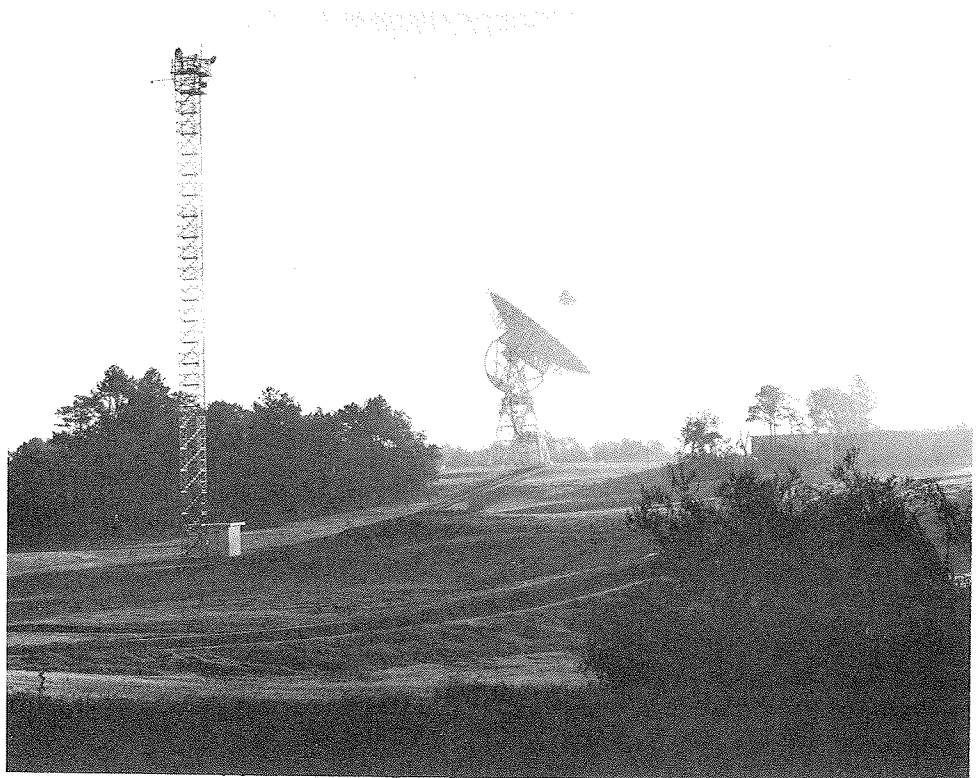
- Multilateral negotiations on a convention for the conservation of Antarctic living marine resources
- Reports and documents on foreign fisheries and markets for use by government and industry
- Agreements with the U.S.S.R. on fishing gear damage conflicts in the Bering Sea
- Negotiations between the U.S. and Canada on salmon resources and Atlantic fisheries affected by boundary claims.

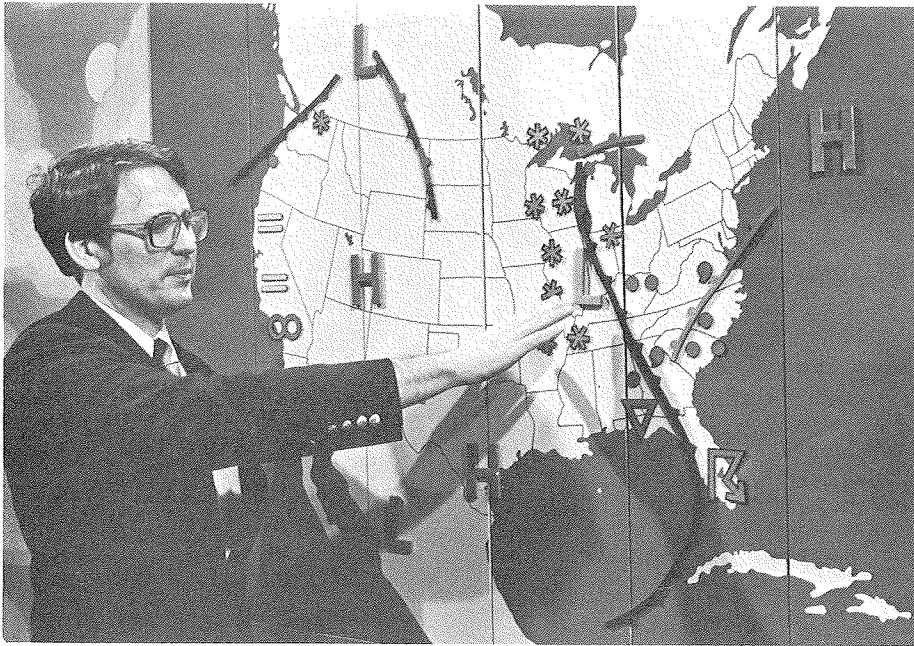
For more information about NOAA's living resource activities, write to Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, Washington, D.C. 20235.

# OCEANIC AND ATMOSPHERIC SERVICES: NOAA Environmental Services

NOAA keeps track of the world's physical environment. NOAA's National Weather Service reports the weather, and provides forecasts, warnings and other weather-related products, through an elaborate network—facilities across the United States including surface and upper-air stations, weather radars, and links with environmental satellites. NOAA's National Environmental Satellite Service manages the country's only civilian operational environmental satellites.

In addition, NOAA's National Ocean Survey prepares nautical and aeronautical charts and other navigational products, maintains the Nation's precise geodetic survey network and performs related hydrographic, oceanographic and survey activities in the environment. NOAA's Environmental Data and Information Service stores and classifies the vast quantities of data these observational services generate, and devises new methods of using this store of scientific data—on subjects as diverse as weather, marine geology and geophysics, earthquakes, and solar activity.





## The National Weather Service

*NOAA's National Weather Service touches the everyday lives of most Americans.*

Weather is monitored by several hundred NOAA facilities across the United States—an elaborate network of surface weather observation stations, upper-air observing stations, automatic weather observing stations, weather radars, and environmental satellites. Data from this network flow to national centers, forecast offices and weather service offices that produce over *two million meteorological forecasts per year*—from daily public forecasts carried on NOAA Weather Radio and the news media to specialized forecasts for other Government agencies.

*The National Meteorological Center in Camp Springs, Maryland is the operating nerve center for weather information.* The Center's computers incorporate more than 100,000 weather reports daily from around the world into physical and numerical models of the atmosphere to produce weather predictions as far as ten days into the future, as well as monthly and seasonal predictions of expected temperature and precipitation conditions over North America.

**Public Weather Forecasts** Weather Service Forecast Offices at 52 locations issue warnings and forecasts for over 600 zones throughout the U.S. Their forecasts are issued three times a day for a 48 hour period, and are updated as necessary. Extended forecasts—looking ahead five days—are issued daily for

statewide areas. Local forecasts—adaptations of zone forecasts for metropolitan areas, cities and towns—are issued by the 52 Forecast Offices and by more than 240 smaller Weather Service Offices.

**Severe Weather** NOAA's daily weather forecasts are highly useful to all citizens. But its severe weather warnings are essential for public safety:

- Hurricane warning services are provided from NOAA's National Hurricane Center in Miami, and from San Francisco and Honolulu.
- The National Severe Storms Forecast Center in Kansas City, Missouri, maintains a constant watch for severe weather potential and development around the country and issues severe thunderstorm and tornado watches and warnings as appropriate.
- Thirteen NOAA river forecast centers around the country provide forecasts and warnings concerning floods and river stage levels for more than 2,000 points along major U.S. river systems.
- NOAA's Honolulu-based tsunami warning system provides early detection and timely warning of tsunamis (sometimes referred to—erroneously—as “tidal waves”) caused by undersea earthquakes and volcanic eruptions throughout the Pacific basin.

The National Weather Service uses guidance from these centers—and information from weather radar, environmental satellites, weather observations,

and volunteer storm spotters—to provide severe weather and flood warnings to every county, parish and major metropolitan area in the country.

**Specialized Services** NOAA meteorologists work with other agencies—to ensure that people with critical needs for specialized weather information receive it in timely and useful fashion. For example:

- Each year NOAA provides specialized meteorological services to thousands of domestic and foreign air carriers and to more than 140,000 general aviation users.
- Specialized weather forecasts are provided by NOAA meteorologists in agricultural areas, to help cut back on our \$1.6 billion annual loss of weather-damaged crops.
- Marine weather and oceanographic services are provided by special NOAA units—for small privately owned craft which operate near shore, for mammoth ocean-going vessels, and for the Nation's fishing fleet.
- NOAA offices across the land provide pollution-potential forecasts and other data to cities with air pollution problems.

**International Activities** As one of three designated World Meteorological Centers, the National Meteorological Center has global weather analysis and forecasting responsibilities. NOAA cooperates with other nations—bilaterally and through the World Meteorological Organization—to assure monitoring of the physical environment and to provide data needed for daily forecasts. NOAA also assists other nations in acquiring, installing and maintaining equipment for observing stations and telecommunications facilities, and in improving meteorological service capabilities of lesser developed countries.

## The National Environmental Satellite Service

Satellite technologies have revolutionized our ability to monitor the Earth's environment. The results are visible to all of us through daily pictures of the cloud cover over the United States and less frequent pictures of the birth and death of hurricanes at sea. But the wealth of new information about the atmosphere, oceans and near space is used for many other purposes as well.



*NOAA's National Environmental Satellite Service—the U.S. Government's only civilian operational satellite system—operates two satellite systems to observe environmental conditions over the land, the oceans, and in near space.*

**GOES** NOAA's two *Geostationary Operational Environmental Satellites* are in orbit 22,000 miles above fixed points on the equator—providing continuous monitoring of environmental conditions over the continental United States, the Eastern Pacific and Western Atlantic oceans.

- Scanning earthward, their infrared and visible-light sensors pick out significant weather indicators—embryonic hurricanes and tropical storms at sea, thunderstorms, snow storms, and flood-producing rains. They also relay information generated around-the-clock by ocean buoys and environmental sensors on the ground.
- Scanning spaceward, another set of sensors reads bursts of radiation and energetic particles from the sun that affect terrestrial communications, electric power distribution and high altitude aircraft flights.

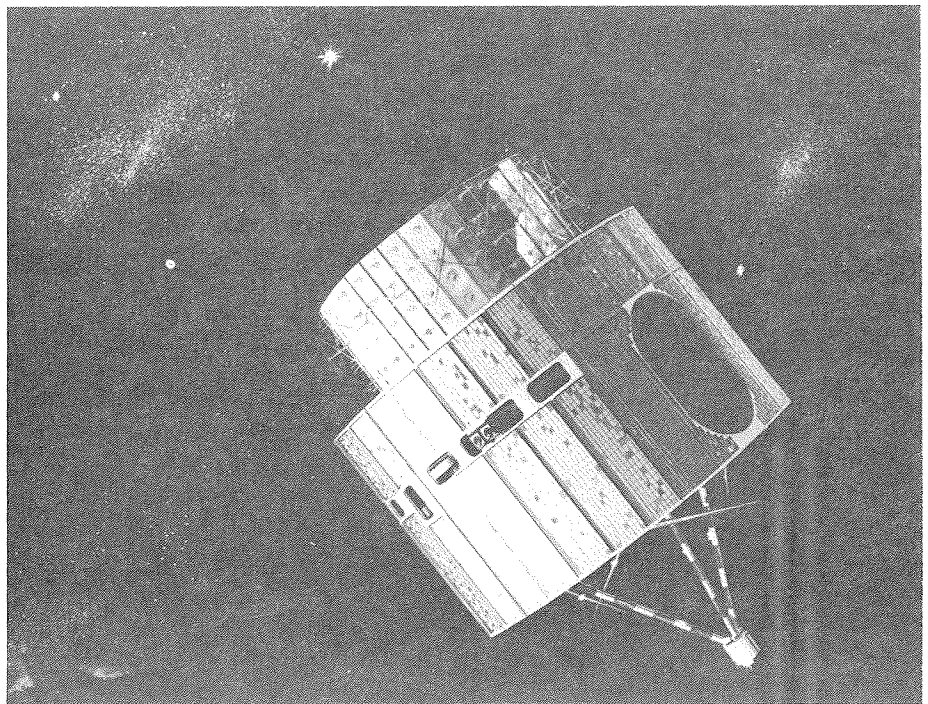
**TIROS** NOAA's two polar-orbiting environmental satellites—presently *the TIROS-N series*—orbit 522 miles above the Earth, covering environmental conditions around the globe.

- Their sensors pick up information on atmospheric temperatures, snow and ice field boundaries, solar activity, and global cloud cover.
- They transmit cloud cover information directly to about 1000 receiving stations around the world.
- The polar system also collects data from fixed and moving platforms—such as drifting buoys—and accurately determines the location of these platforms.

### Space Services: Solar Flares

At NOAA's Space Environment Services Center in Boulder, Colorado, scientists monitor the "weather" of interplanetary space—and issue warnings when eruptions on the sun will affect activities on and near the Earth.

- NOAA warns of bursts of energy from the Sun—and the subsequent changes in the Earth's magnetic field—that can cause electrical surges



- in power and communications lines, induce electrical charging in spacecraft and disrupt short-wave radio communications.
- Solar radiation is also measured by NOAA, because it can pose a hazard to astronauts outside their vehicles and to airplane passengers, especially on high-altitude polar routes.

### The National Ocean Survey

*NOAA's National Ocean Survey*—the successor to the U.S. Coast and Geodetic Survey—is one of our oldest Federal services.

**Surveying and Charting Services** The National Ocean Survey provides and maintains continental networks of hundreds of thousands of bronze geodetic markers—reminders that all of the United States is tied together by precise geodetic control surveys.

NOAA's surveys provide accurate, nationwide reference points for longitude, latitude, and elevations above sea level. The geodetic network it maintains is the essential starting point for:

- Land surveyors and engineers
- Regional planning groups and public officials
- Mapping and charting
- Defense systems
- Taxation and recording surveys
- Transportation and communications systems layouts

- Studies of the movement of the Earth's crust
- Routing of utility lines
- Storm inundation mapping
- Land and seaward boundary demarcation
- Missile and satellite tracking
- Major drainage basin studies
- Deep-water port siting and construction
- Offshore oil, gas, and mineral exploration and extraction

**Nautical Charting** Charting the Nation's coastal areas, Great Lakes, and ocean waters is a major part of NOAA's cartographic work

- NOAA's ships go to sea with high-speed computers and plotters, reducing raw sounding data and other hydrographic findings to information used in producing and updating nautical charts.

- NOAA's aerial photogrammetry provides basic data for coastal and nautical maps, charts and surveys.

*NOAA distributes more than 2.5 million nautical maps and charts annually.* Half of them go to other Government agencies. An equal quantity is used by those who go to sea and sail the Great Lakes—for recreational boating as well as for marine commerce.



New kinds of maps and charts have been developed for modern needs—storm evacuation maps for low-lying flood-prone coastal areas, bathymetric maps of the continental shelf for ocean resource management, coastal zone maps for land-use studies, and maps of volcanic thermal activities nationwide.

**Aeronautical Charts** *NOAA prepares and distributes 40 million aeronautical charts and accessory publications annually*—charts depicting domestic airways in a range of scales and formats for commercial and general aviation; obstruction charts to help determine safe takeoff and landing procedures and to provide data for airport improvement engineering; and flight control charts to help air traffic controllers.

NOAA has a variety of other related oceanographic responsibilities:

- Tide and current predictions
- Great Lakes water-level monitoring programs
- Preparation of tidal data for establishing marine boundaries
- Wave-monitoring programs for scientific, environmental and engineering projections
- Surveying and modeling the circulatory and other dynamic processes of estuaries subject to heavy environmental stress
- Monitoring the ecological effects of dumping waste materials into ocean and Great Lakes waters.

**The NOAA Fleet** NOAA's fleet of 25 oceanographic and fishery research and survey ships is operated by the National Ocean Survey. Ranging in size from the 86-foot (26-meter), 295-ton (268-metric

ton) MURRE II to the 303-foot (91-meter), 4,033-ton (3,659 metric ton) OCEANOGRAPHER, the new generation of NOAA survey ships has broad hydrographic, oceanographic, marine geophysical, and biological capabilities.

### **Environmental Data and Information Service**

NOAA uses its observational data for immediate purposes—a weather forecast, a solar warning, or a smallcraft chart. This information is eventually transferred to one of the national data centers operated by NOAA's Environmental Data and Information Service, where it is merged with global observations from many other sources.

*These trillions of bits of stored information constitute an invaluable environmental history of our age*—an incalculably rich archive available to scientists and members of the public engaged in a wide variety of research and planning studies.

From this massive archive, NOAA provides products and services to over 100,000 users each year—in industry, agriculture, the scientific and engineering community, the general public, and Federal, state, and local governments. These resources are also used by NOAA's and other scientists—to assess the impact of environmental fluctuations on matters such as energy development, production, distribution, and use; global food production; environmental quality; telecommunications; coastal zone development; disaster mitigations; and even human health.

NOAA data specialists are not passive archivists. They apply their unique resources and expertise to tailor their products, services, and assessments to user needs. They also help shape the

form in which observations are taken to maximize their usefulness. To this end, they provide experiment design, data management, and analysis support to massive, multi-disciplinary national and international data collection operations, such as the Atlantic Tropical Experiment of the Global Atmospheric Research Program.

These products and services are provided by five specialized service centers.

- World meteorological data are available from the National Climatic Center in Asheville, North Carolina.
- Global marine geological and geophysical data, earthquake data, and solar-terrestrial data are available from the National Geophysical and Solar-Terrestrial Data Center in Boulder, Colorado.
- Data for scientific observations of the global oceans are available from the National Oceanographic Data Center in Washington, D.C.
- Scientific and technical literature and information concerning the environment and marine resources are available from the Environmental Science Information Center in Rockville, Maryland.
- Assessments of the impacts of environmental variations on life support and other environmentally sensitive systems are provided by the Center for Environmental Assessment Services in Washington, D.C.

For more information about NOAA's environmental services, write to Assistant Administrator for Oceanic and Atmospheric Services, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.

# COASTAL ZONE MANAGEMENT: Competing Demands for Ocean and Coastal Resources

More than half the United States population is located in coastal counties, where demands for industry, housing, transportation, energy, recreation, food supply and waste disposal are increasing rapidly. NOAA's Office of Coastal Zone Management administers the Coastal Zone Management Act of 1972, designed to assist States in reconciling these increasing, often conflicting, demands. NOAA funds assist coastal states in developing and carrying out comprehensive programs for managing their coastal zones, protecting valuable coastal resources such as wetlands and beaches, and increasing access for recreation. NOAA also provides Coastal Energy Impact Program grants and loans to state and local governments to offset the effects of such energy-connected activities as offshore petroleum development.



The Office of Coastal Zone Management also administers programs to protect and preserve unique coastal areas. NOAA's Estuarine Sanctuaries Program preserves and restores valuable estuarine systems, and its Marine Sanctuaries Program protects unique areas of United States coastal waters and the Great Lakes for their conservation, recreational, ecological, and aesthetic values. Finally, NOAA is a source of innovative programs seeking to assure that Federal decisions on matters such as ocean dumping, deep water ports, and outer continental shelf oil and gas development take into account existing or potential conflicts with other marine users.

## State Coastal Zone Management Programs

More than half the population of the United States is located in coastal counties—our eight largest cities, nearly half our manufacturing capacity, more than 60 of our oil refineries.

*In 1972 the Congress recognized as a pressing problem the increasing demand for the limited supply of coastal lands and shorelines.* The Coastal Zone Management Act authorized NOAA to conduct a National effort to improve the management of our coastal zones. NOAA's Office of Coastal Zone Management provides financial and technical assistance to states voluntarily participating in the Federal program.

**Coastal Management Plans** States have wide discretion in constructing coastal management plans. The plans generally:

- Identify specific coastal areas that need protection
- Map coastal zone boundaries

- Provide for location of facilities of more than local significance, such as major new port facilities
- Encourage arrangements to guarantee public involvement in important coastal use decisions.

**Federal Assistance** NOAA provides dual incentives for states to develop and operate coastal zone management programs.

First is direct financial assistance—grants to plan and administer state programs. Planning grants became available in 1974 and continued through 1979. Upon approval of their plans, states may receive grants to administer their programs. Typically states redistribute some of these funds to local or regional governments—to help the program work or to fund special projects.

Second is the “consistency provision” of the Act—once the program is approved, Federal actions affecting the state’s coastal zone must be consistent with the state’s plan.

**Dramatic Results** *All 30 coastal states and four of the five eligible territories have participated in the program.* Coastal programs of 19 states—covering 68% of the United States shoreline—received Federal approval by the end of 1979.

Few of the approved state programs have been in effect long, but early results are encouraging:

- New legislation or regulations have been enacted to protect significant natural resources—wetlands, endangered flora and fauna habitats, beaches and dunes, barrier islands and offshore reefs.
- States are controlling construction in floodplains and coastal areas subject to erosion, saltwater intrusion of subsidence. And they are providing environmentally appropriate sites for water dependent uses, energy facilities, and dredge spoil disposal.
- Access to the shoreline for recreation is improving—through new development regulations, open beach and scenic protection laws, urban waterfront projects, and restoration of historic trails, seaports and buildings.

## Coastal Energy Impact Funds

*The coastal zone is the site of much of our Nation’s energy related activities—*

power plants, petroleum refineries and offshore oil development. These facilities increase the financial burdens on local communities, creating demands for new schools, hospitals, roads and sewers.

The Coastal Energy Impact Program was established in 1976 to assist states and communities in coping with the social, economic, and environmental costs of coastal energy development. Through Fiscal Year 1979, the Congress had appropriated \$285 million for these programs. Only states participating in the Coastal Zone Management Program can receive such energy impact funds.

## Sanctuary Programs

The Office of Coastal Zone Management administers the *National Marine Sanctuaries Program*. The Program is authorized—with Presidential approval—to designate ocean waters as sanctuaries, to preserve or restore their unique conservation, recreation, ecological, or esthetic values.

Two marine sanctuaries have been designated—

- The Monitor Marine Sanctuary off Cape Hatteras in North Carolina protects the wreckage of the Civil War iron-clad ship USS MONITOR.
- The Key Largo Coral Reef Marine Sanctuary near Miami, Florida protects a 100-square mile coral reef area adjacent to the John Pennekamp Coral Reef State Park.

*At the President’s request, NOAA is accelerating the designation of new marine sanctuaries.* The Office of Coastal Zone Management is now reviewing a large number of nominations.



*The Estuarine Sanctuaries Program* offers States 50 percent cost-sharing grants to purchase and manage relatively undisturbed estuarine areas for research and other purposes. Five estuarine sanctuaries now exist—one each in Florida, Georgia, Oregon, Ohio and Hawaii, the first in a planned network of 21 unique estuarine sanctuaries in coastal regions around the country.

## Ocean Resources Coordination and Assessment

*NOAA’s Office of Ocean Resources Coordination and Assessment analyzes competing demands on ocean resources to help resolve conflicts among potential users.*

This Office brings a broad ocean perspective to decisions affecting ocean use that are made by other Federal agencies with narrower responsibilities—for oil and gas development, tanker safety and pollution regulations, port access route proposals, deepwater port siting, ocean waste disposal, and ocean and coastal recreation.

It also develops and applies new techniques for analysis and planning of multiple ocean and coastal resource uses. For example, it has identified areas on the United States East Coast unsuitable for major energy facility sites, developed and refined models for fiscal, environmental, and economic analysis of outer continental shelf oil development, and studied the economic losses caused by the AMOCO-CADIZ oil spill in France.

For more information about NOAA’s coastal zone management activities, write to Assistant Administrator for Coastal Zone Management, National Oceanic and Atmospheric Administration, Washington, D.C. 20235.

# RESEARCH AND DEVELOPMENT:

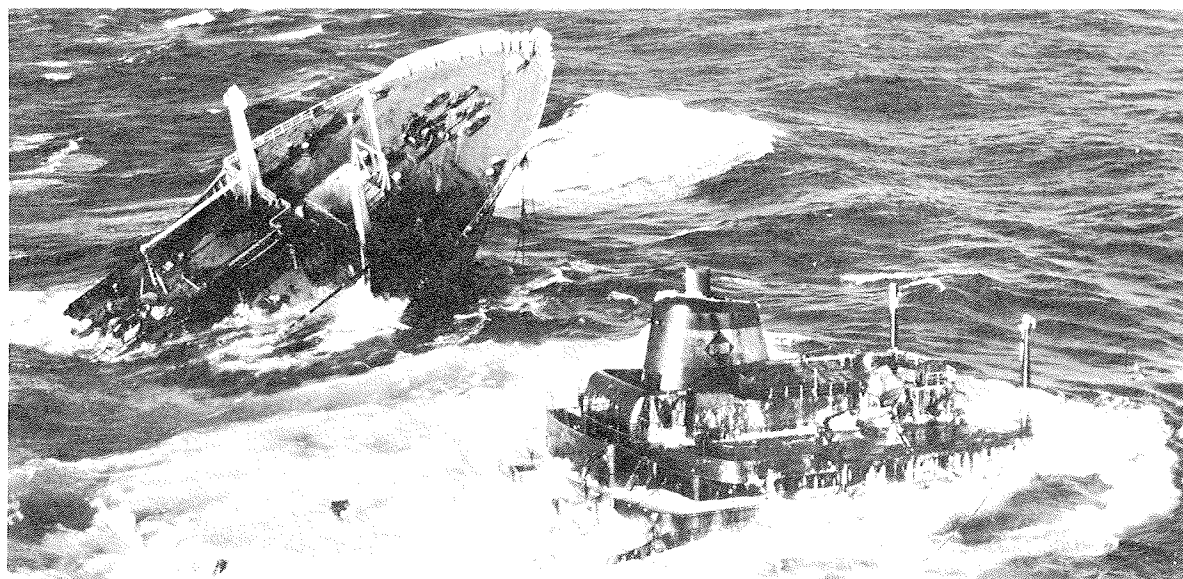
## New Knowledge, New Technologies

NOAA's research and development programs aim to improve our understanding of the oceanic and atmospheric environments, and to apply this new knowledge to the solution of environmental problems. NOAA's Environmental Research Laboratories conduct basic and applied research in oceanic and atmospheric sciences, through a nationwide system of 12 laboratories. NOAA's Office of Ocean Engineering conducts advanced marine engineering development activities. Its Office of Marine Pollution Assessment studies the problems of ocean pollution. And NOAA's National Climate Program Office coordinates Federal and other efforts to estimate trends in global climate change.

NOAA maintains strong research links with the academic community. Its Office of University Affairs works to strengthen and expand these ties. And its National Sea Grant College Program supports programs at institutions around the country.

### Ocean R&D Programs

Much of NOAA's research focuses on bringing new knowledge impacts of marine resource management, and on the relationships of ocean ecosystems and human life ashore.



**Ocean Pollution** *Public concern is mounting about the impacts of pollutants that ultimately find their way into the oceans—petroleum, sewage sludge, PCB's, and heavy metals.*

Congress has responded with the Ocean Pollution Research, and Development and Monitoring Planning Act of 1978. It charges NOAA with the lead role in developing a comprehensive five-year plan of investigation—for the entire Federal Government—into the extent, fates and effects of these pollutants. NOAA is also establishing methods to monitor changes in these pollution levels and effects over time.

Major ecosystem investigations are conducted by NOAA through the Marine Ecosystems Analysis (MESA) program

- MESA's New York Bight Project explores the impacts of marine pollutants on the New York-New Jersey coast, and the millions of people who live there.
- Similar investigations are underway for Washington State's less heavily impacted Puget Sound, and Alaska's relatively pristine Prince William Sound.

**Marine Resource Management** MESA's Deep Ocean Mining Environmental Study has been working in the Pacific, where rich beds of nodules containing manganese and other valuable minerals lie on the deep ocean floor. Its objective—to describe the ocean environment before mining begins, and to estimate the probable impacts of mining operations.

NOAA also manages one of the largest environmental studies ever undertaken by the United States. The Outer Continental Shelf Environmental Assessment Program—funded by the Interior Department's Bureau of Land Management—seeks to determine the impact of oil and gas development on the Alaskan shelf. NOAA has developed a uniquely equipped team of experts, to study the effects of oil spills on seas and shorelines.

**New Technologies** Some of the new technology developed for the Alaskan investigations has come from the Wave Propagation Laboratory—NOAA's focal point for new methods for remote measurement of natural phenomena. For example, it has developed radars capable of sensing ocean surface currents over an area of 4,000 square

miles, useful for monitoring movement of oil offshore.

NOAA's *Office of Ocean Engineering* also contributes to safe and effective development of ocean resources and protection of the ocean environment, by:

- Establishing a comprehensive engineering program to provide oceanographic instruments and measurement systems required for National ocean activities
- Providing the engineering capability and technology to support NOAA's ocean and coastal zone management and environmental protection activities.
- Developing and deploying environmental buoys capable of remaining at sea for long periods, measuring atmospheric and oceanic conditions, and automatically relaying information to shore via satellite
- Developing manned underwater platforms to meet National ocean research needs.

**International Activities** *Many NOAA ocean science activities are carried out jointly with other nations—projects ranging over the entire field of ocean studies, from the impacts of oil spills to studies of ocean currents on a planetary scale.*

Some programs involve the United Nations and its specialized agencies, such as UNESCO's Intergovernmental Oceanographic Commission, to which NOAA's Assistant Administrator for Research and Development is the United States representative, and the Food and Agriculture Organization. Others—conducted under bilateral programs—include cooperation with the U.S.S.R. in studies of the world ocean, and the U.S.-French Cooperative Program in Oceanographic Research.

### Atmospheric R&D Programs

*NOAA's atmospheric investigations range from short-term weather phenomena to long-term climate fluctuations, and from basic atmospheric dynamics to applied weather forecasting technologies.*

**Atmospheric Pollution** Atmospheric pollution research plays a prominent role at NOAA:

- NOAA researchers work with Department of Energy scientists in Oak Ridge, Tennessee, and at the reactor test center in Idaho Falls, Idaho.

- A NOAA laboratory at Research Triangle Park, North Carolina, provides meteorological expertise to the United States Environmental Protection Agency.
- Remote sensing techniques and precise laboratory measurements detect pollutants in the urban atmosphere.
- A NOAA study seeks connections between the sources of tiny air-suspended particles and the quality of the air a hundred or more miles downwind.

**Improving Weather Services** Utilizing its remote sensing research, NOAA is developing a *Prototype Regional Observing and Forecasting System*. Its objective: improving short-term (0-12 hours) local weather forecasts, by applying technological and meteorological advances of the past 20 years—doppler radar, remote observations, computers, and new communications techniques.

In addition:

- NOAA's severe storms research focuses primarily on better understanding thunderstorms and tornadoes.
  - NOAA studies hurricanes—the environmental conditions that produce them over the tropical ocean, ways these conditions and the storms themselves can be simulated mathematically, and how timeliness and accuracy of warnings can be improved.
- NOAA's hurricane researchers are also leaders in experimental efforts to modify weather phenomena beneficially.
- NOAA's Project Stormfury experiment is designed to determine whether destructive hurricane winds can be reduced by cloud seeding.

- NOAA's Florida Area Cumulus Experiment is evaluating the effect of seeding on tropical cumulus cloud precipitation.

**Studies of Basic Phenomena** *NOAA research is contributing to a basic understanding of atmospheric phenomena.*

In many areas of scientific endeavor, NOAA is a recognized world leader. The *Geophysical Fluid Dynamics Laboratory* in Princeton, New Jersey, for example, studies the processes governing the behavior of the atmosphere and oceans as complex fluid systems.

- GFDL researchers work with the world's most advanced numerical models on the largest available computers.
- They study predictability, stability, and sensitivity of global and regional climate, ocean structure, variability, and dynamics over many space and time scales, the interactions of atmosphere and oceans, and their manner of storing and transporting matter and energy.
- They apply a variety of scientific disciplines: meteorology, oceanography, hydrology, classical physics, fluid dynamics, chemistry, applied mathematics, highspeed digital computation, and experimental design and analysis.

*The Air Resources Laboratories* is another outstanding example of NOAA interdisciplinary activities. Its meteorological expertise helps other Government agencies understand and predict human influences on the environment. For example, this facility contributes authoritative information to the continuing debate over modification of the Earth's ozone layer by fluorocarbons, and its research on the capacity of the land and the sea to absorb carbon dioxide will shape future discussions on whether the burning of fossil fuels should be restricted.

NOAA research is not confined to the lower atmosphere. NOAA's *Space Environment Laboratory*, for example, does research on the space environment and high upper atmosphere to understand the interactions of Sun and Earth, and to explore such phenomena as the chemical creation and destruction of ozone in the stratosphere.

**International Activities** *As with its oceanic sciences, NOAA's atmospheric research involves extensive international cooperation.* For example:

- NOAA's Associate Administrator is the U.S. representative to the World Meteorological Organization.
- NOAA participates in the WMO's World Weather Watch and its Precipitation Enhancement Project.
- NOAA is responsible for implementing a major program concerning the influence of environmental changes on climate, under the U.S.-U.S.S.R. Agreement on Protection of the Environment.
- NOAA operates a joint upper air sounding facility in Beijing with the People's Republic of China.
- NOAA leads United States participation in the Global Atmospheric Research Program, an international effort under the joint sponsorship of the World Meteorological Organization and the International Council of Scientific Unions.

One of the most exciting of NOAA's recent international activities is the Global Weather Experiment, conducted during 1978 and 1979. *This was the world's largest experiment*—involving 140 countries, five international organizations, 5,000 technicians, and satellites from the United States, U.S.S.R., Japan and the European Space Agency.

It was aimed at better understanding atmospheric motions—so that realistic numerical models can be developed for extended-range forecasting of general circulation and climate, assessing the limit of predictability of weather systems, and designing an observing system for routine numerical weather prediction on a global basis.

### The National Climate Program

*Concern is growing about the global interaction of human activities and climate. The National Climate Program Act of 1978* charged NOAA with developing a National Climate Program Plan and coordinating the work of Federal and non-Federal participants—to estimate trends in climate change and the nature of climates to come, while there is still time to mitigate the effects of drastic climate change.

We are injecting increasing quantities of effluents into the atmosphere—altering its physical and chemical properties in ways that may adversely affect the world's climate. To track such changes, NOAA also operates the network of four baseline monitoring stations—at Mauna Loa, Hawaii; Point Barrow, Alaska; American Samoa; and the South Pole. These stations measure atmospheric constituents—carbon dioxide, oxides of nitrogen, ozone, ammonia, fluorocarbons, atmospheric dust condensation and cloud freezing nuclei, aerosols, and solar radiation.

### Cooperative University Programs

*NOAA maintains strong research links with the academic community.*

One of the most important ways of encouraging productive peer collaboration between NOAA and academic researchers is through cooperative agree-

ments with universities. NOAA has such agreements with:

The University of Colorado  
The University of Hawaii  
The University of Oklahoma  
The University of Miami  
The University of Washington

NOAA's Office of University Affairs works to ensure that the agency's research links with the academic community are strengthened and expanded.

**Sea Grant** *NOAA's strongest university links are forged through its National Sea Grant College Program.*

Congress established Sea Grant in 1966—to increase the understanding, assessment, development, utilization and conservation of the Nation's ocean and coastal resources. The program has developed into a system modeled after the land grant college system established a century earlier. To date, 13 institutions have achieved Sea Grant College status, and Federal funds have supported programs at 125 institutions and 675 projects around the Nation. This Federal investment has been augmented by at least 50% matching non-Federal funds from the universities in the program.

Among Sea Grant's notable achievements are the following:

- Its programs are leading to development of pharmaceutical products from the sea, many of which show promise in the treatment of cancer, cardiovascular diseases and problems of the central nervous system.
- Projects are increasing production of foods from the sea by advancing marine animal and plant aquaculture.
- Sea Grant universities are focusing on the ecological, legal, and technical problems of developing energy from the sea, and are improving the design of oil spill recovering vessels.

Sea Grant has become a prime mover in expanding and enhancing marine sciences curricula in elementary and secondary schools. It also operates a unique marine advisory service—to help disseminate new knowledge from Sea Grant researchers to the community of users, and to transmit that community's responses and needs back to researchers.

For more information about NOAA's R&D activities, write to Assistant Administrator for Research and Development, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.



# NOAA CORPS: The Seventh Service



*NOAA is home to the Nation's seventh and most special uniformed service—the NOAA Corps—400 officer-scientists who serve NOAA in a broad spectrum of environmental assignments.*

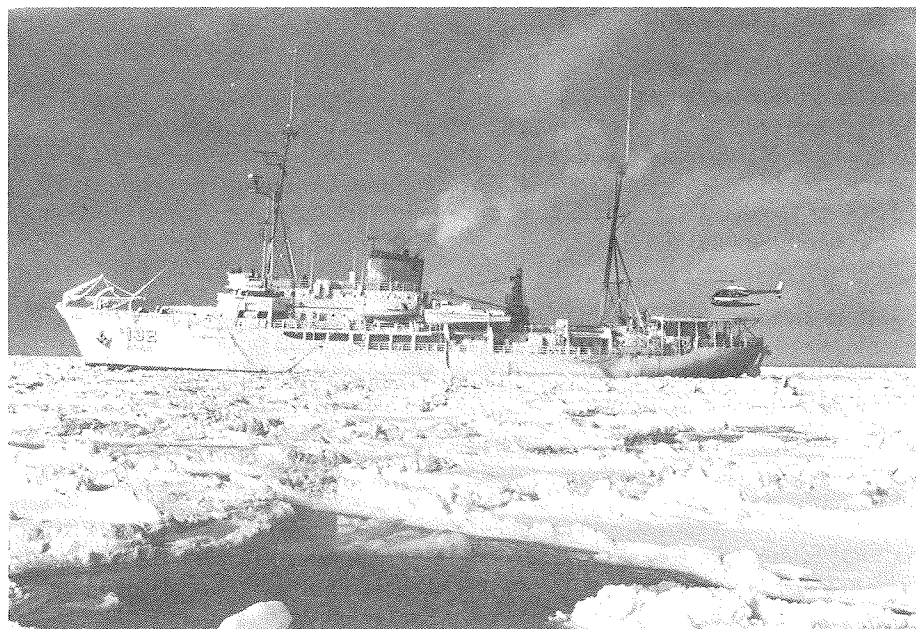
The Corps was created in 1917, to provide engineers qualified for marine command who could conduct hydrographic and geodetic surveys. Since then, the NOAA Corps has accumulated a variety of additional roles in the oceanic and atmospheric sciences—work in geodesy, photogrammetry, hydrographic surveying, measurements of gravity, tides and currents, and cartography.

Today Corps officers include men and women trained as engineers and scientists, working in every environmental discipline—including oceanography, meteorology, biology, and physics.

- Sea duty is a common denominator for every NOAA Corps officer—oceanographic studies, hydrographic surveying, and command of NOAA's fleet. Corps officers also fly NOAA's research aircraft, helicopters, and photographic aircraft.
- Tours of duty include research in laboratories around the country. Mobile shore duty now involves field work in geodesy, photogrammetry, hydrography, and tide monitoring.
- NOAA Corps officers can be found managing the agency's Marine Ecosystems Analysis program in Prince William Sound, Alaska, working on a solar radiation project at NOAA's Space Environmental Laboratory, and working on an acoustic echo sounder at the National Science Foundation's Clean Air Facility.

Most NOAA Corps officers are recruited upon graduation from college, and train at the NOAA Officer Training Center in Kings Point, New York—which NOAA shares with the Commerce Department's Merchant Marine Academy. Others are recruited from the armed services, entering NOAA after training at Kings Point.

For more information about the Seventh Service, write to Director, NOAA Corps, National Oceanic and Atmospheric Administration, Rockville, Maryland 20852.



## National Oceanic and Atmospheric Administration Location of Major Facilities

### Office of the Administrator

Commerce Building  
14th & E Streets, N.W.  
Washington, D.C. 20230

### Office of Fisheries

National Marine Fisheries Service,  
Headquarters  
Page Building #2  
3300 Whitehaven Street, N.W.  
Washington, D.C. 20235

Alaska Regional Office  
709 W. 9th Street  
Juneau, Alaska 99801

Northwest and Alaska Fisheries Center  
Kodiak, Alaska 99615

Northwest Regional Office  
1700 Westlake Avenue N  
Seattle, Washington 98109

Northwest & Alaska Fisheries Center  
2725 Montlake Boulevard, East  
Seattle, Washington 98102

Southwest Regional Office  
Federal Building, Room 2016  
300 South Ferry Street  
Terminal Island, California 90731

Southwest Fisheries Center  
8604 LaJolla Shores Drive  
LaJolla, California 92037

Southeast Regional Office  
9450 Koger Boulevard  
Duval Building  
St. Petersburg, Florida 33702

Southeast Fisheries Center  
75 Virginia Beach Drive  
Miami, Florida 33149

Northeast Regional Office  
14 Elm Street, Federal Building  
Gloucester, Massachusetts 01930

Northeast Fisheries Center  
Water Street  
Woods Hole, Massachusetts 02543

Auke Bay Laboratory  
Auke Bay, Alaska 99821

Honolulu Laboratory  
2570 Dole Street  
Honolulu, Hawaii 96812

Tiburon Laboratory  
3150 Paradise Drive  
Tiburon, California 94920

Galveston Laboratory  
4700 Avenue U  
Galveston, Texas 77550

Pascagoula Laboratory  
3209 Frederick Street  
Pascagoula, Mississippi 39567

National Fisheries Engineering  
Laboratory  
National Space Technology Laboratories  
NSTL Station, Mississippi 39520

Panama City Laboratory  
3500 Dellwood Beach Road  
Panama City, Florida 32407

Charleston Laboratory  
217 Ft. Johnson Road  
Charleston, South Carolina 29412

Beaufort Laboratory  
Rivers Island  
Beaufort, North Carolina 28516

Oxford Laboratory  
Northeast Fisheries Center  
Railroad Avenue  
Oxford, Maryland 21654

Sandy Hook Laboratory  
Northeast Fisheries Center  
Building #74  
Highlands, New Jersey 07732

Milford Laboratory  
Northeast Fisheries Center  
212 Rogers Avenue  
Milford, Connecticut 06460

Narragansett Laboratory  
Northeast Fisheries Center  
RR7 - S. Ferry Road  
Narragansett, Rhode Island 02882

Gloucester Laboratory  
Northeast Fisheries Center  
Emerson Avenue  
Gloucester, Massachusetts 01930

Woods Hole Laboratory  
Northeast Fisheries Center  
Water Street  
Woods Hole, Massachusetts 02543

### Office of Oceanic and Atmospheric Services

Office of Oceanic and Atmospheric  
Services Headquarters  
Washington Science Center, Building #5  
6010 Executive Boulevard  
Rockville, Maryland 20852

National Weather Service, Headquarters  
8060 13th Street  
Silver Spring, Maryland 20910

National Weather Service  
Eastern Region Headquarters  
585 Stewart Avenue  
Garden City, New York 11538

National Weather Service  
Southern Region Headquarters  
819 Taylor Street, Room 10E09  
Fort Worth, Texas 76102

National Weather Service  
Central Region Headquarters  
601 East 12th Street, Room 1736  
Kansas City, Missouri 64106

National Weather Service  
Alaska Region Headquarters  
632 6th Avenue  
Anchorage, Alaska 99501

National Weather Service  
Pacific Regional Headquarters  
Prince Kuhio Federal Bldg., Room 4110  
300 Ala Moana Boulevard  
Honolulu, Hawaii 96850

Environmental Data and Information  
Services Headquarters  
3300 Whitehaven Street, N.W.  
Washington, D.C. 20235

Center for Environmental Assessment  
Services  
3300 Whitehaven Street, N.W.  
Washington, D.C. 20235

Environmental Science Information Center  
Rockwall Building  
11400 Rockville Pike  
Rockville, Maryland 20852

National Oceanographic Data Center  
2001 Wisconsin Avenue, N.W.  
Washington, D.C. 20235

National Climatic Center  
Federal Building  
Page & O'Henry Avenues  
Asheville, North Carolina 28801

National Geophysical and Solar-Terrestrial  
Data Center  
3100 Main Street  
Boulder, Colorado 80303

National Ocean Survey, Headquarters  
Washington Science Center, Building #1  
6001 Executive Boulevard  
Rockville, Maryland 20852

Atlantic Marine Center  
439 West York Street  
Norfolk, Virginia 23510

Pacific Marine Center  
1801 Fairview Avenue, East  
Seattle, Washington 98102

National Environmental Satellite  
Service Headquarters  
Federal Building 4, Room 2069  
Suitland Road  
Suitland, Maryland 20233

NOAA Officer Training Center  
U.S. Merchant Marine Academy  
Furusetth Hall, Steamboat Road  
Kings Point, New York 11024

**Office of Coastal Zone  
Management**

Page Building #1  
2001 Wisconsin Avenue, N.W.  
Washington, D.C. 20235

**Office of Research  
and Development**

Office of Research  
and Development, Headquarters  
Washington Science Center, Building #5  
6010 Executive Boulevard  
Rockville, Maryland 20852

Environmental Research Laboratories,  
Headquarters  
325 N. Broadway  
Boulder, Colorado 80303

Joint Institute for Marine &  
Atmospheric Research  
2525 Correa Road  
University of Hawaii  
Honolulu, Hawaii 96822

Cooperative Institute for Research  
in Environmental Science (CIRES)  
39th & Marine Streets  
University of Colorado  
Boulder, Colorado 80309

Cooperative Institute of Marine  
and Atmospheric Studies (CIMAS)  
4600 Rickenbacker Causeway  
Miami, Florida 33149

Cooperative Institute for Mesoscale  
Meteorological Studies (CIMMS)  
School of Meteorology  
University of Oklahoma  
200 Felgar Street, Room 219  
Norman, Oklahoma 73019

Joint Institute for the Study of the  
Atmosphere and Ocean (JISAO)  
Department of Atmospheric Sciences  
University of Washington  
Seattle, Washington 98195

Atlantic Oceanographic and Meteorological  
Laboratories  
15 Rickenbacker Causeway, Virginia Key  
Miami, Florida 33149

Great Lakes Environmental Research  
Laboratory  
2300 Washtenaw Avenue  
Ann Arbor, Michigan 48104

Pacific Marine Environmental Laboratory  
3711 15th Avenue, N.W.  
Seattle, Washington 98105

Meteorological Laboratory  
National Environmental Research Center  
Davis Drive, Building C  
Research Triangle Park,  
North Carolina 27711

Air Resources Atmospheric Turbulence  
and Diffusion Laboratory  
465 S. Illinois Avenue  
Oak Ridge, Tennessee 37830

Geophysical Fluid Dynamics Laboratory  
Princeton University, James Forrestal Campus  
Route #1  
Princeton, New Jersey 08540

National Severe Storms Laboratory  
1313 Halley Circle  
Norman, Oklahoma 73069

National Hurricane & Experimental  
Meteorology Laboratory  
Gables One Tower, Room 613  
1320 S. Dixie Highway  
Coral Gables, Florida 33140

Research Facility Center  
3400 N.W. 59th Avenue  
Miami, Florida 33152

Office of Marine Pollution Assessment  
11400 Rockville Pike  
Rockville, Maryland 20852



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
Rockville, MD 20852